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(54) Disk type inverter-stacker

Schaufelrad-blattwender Stapler

Dispositif de retournement et d'empilage à disque

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US-A- 5 058 880
US-A- 5 114 135
US-A- 5 409 201

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Description

[0001] The present invention relates to improvements in or relating to disk type inverter-stackers, and is more particularly concerned with an improved disk type inverter-stacker with improved control of the sheets being inverted and stacked.

[0002] It well known in reproduction apparatus to use disk type inverter-stackers for inverting and stacking sheets as they leave the apparatus. Examples of disk stacker systems with registration assistance devices are described in US-A-5 058 880 and US-A-5 114 135. An integral disk type inverter-stacker and stapler system with a bail system is described in US-A-5 409 201. Another example of a disk stacker wherein the stacking of flimsy sheets, especially the trailing ends thereof, is described in US-A-5 261 655. The disk stacker described therein, however, calls for corrugation of the trailing areas of the sheets while they are in the disk with intermittently interdigitated rollers and a stacking assistance belt.

[0003] Each sheet is released in a position or plane spaced above the top of a stack allows the sheet to temporarily "float" on an air cushion between the released sheet and the top sheet of the stack, and that can undesirably result in an uncontrolled movement of the sheet out of the desired stacking registration position. Once the sheet is released from the controlling slots or nips of the fingers of a disk stacker, typically by being stripped therefrom by a registration wall or fingers, the sheet is no longer under the control of the disk system. A free-floating entering sheet which is released above the top of the stack can even rebound or bounce away from the registration wall or registration fingers, since there is then no pinch or hold on the paper, unless a non-slip bail normal force is or has been applied to the top of the incoming sheet. However, such bails themselves, depending on their mass, can bounce and briefly lose engagement with their underlying sheet. Also, if the bail first engages the sheet while the sheet is still up in the air, this considerably reduces the engagement force and thus the holding force on the sheet by the bail.

[0004] Moreover, providing a system in which the fingers of the disk stacker release the incoming sheet closer to the top of the stack could result in undesirable rubbing of the outer surface of the finger ends with a pressure which would be undesirable and probably uneven between fingers due to inevitable differences in stack height or alignments. This could result in a skewing force or even sheet creasing or abrading of the upper sheets of the stack, or stalling of the disks. Reducing the diameter of prior art disk stackers to avoid the latter problems would undesirably raise their sheet release point, and reduce the control of the trail edge of the paper during the flip-over and dropping of the sheet to the stack, particularly for larger and/or flimsy sheets of paper.

[0005] In reproduction apparatus such as xerographic and other copiers and printers or multifunction machines, it is increasingly important to provide faster yet more reliable and more automatic handling of the physical image bearing sheets. It is desirable to reliably feed and accurately register sheets of a variety and/or mixture of sizes, types, weights, materials, humidity, and other conditions or susceptibility to damage. In particular, it is desirable to minimize sheet misfeeding, skewing, jamming, wear or damage. The sheets which may be handled in or outputted from reproduction apparatus may even have curls, wrinkles, tears, "dog-ears", punched holes, adhesive, slippery areas, or other irregularities. Sheets can vary considerably even if they are all of the same "standard" size, (e.g. letter size, legal size, A-4, B-4, etc.). They may have come from different paper batches or have variably changed size with different age or humidity conditions, different imaging, fusing, etc. Sheet misregistration or misfeeding can also adversely affect further feeding, ejection, stacking and/or finishing.

[0006] It is therefore an object of the present invention to provide an improved disk type inverter-stacker which overcomes the problems mentioned above.

[0007] In accordance with one aspect of the present invention, there is provided a disk type sheet inverting and stacking system having a stacking registration position, the system comprising rotatable disk units with sheet transporting slots for transporting printed sheets output by a reproduction system, the sheets being inverted by rotation of the disk units and then released from the sheet transport slots thereof to be stacked on top of a stack located at the stacking registration position; characterized in that each rotatable disk unit comprises finger units mounted thereon for radial movement relative thereto, the radially movable finger units forming the sheet transporting slots thereon so that the finger units provide variable radius and variable position for the sheet transporting slots with radial movement of the pivotal finger units; and in that the finger units automatically adjust their radius to release sheets from their respective sheet transporting slots closely adjacent to the top of the stack of sheets at the stacking registration position thereby automatically compensating for variations in the height of the stack at the stacking registration position.

[0008] Advantageously, the finger units automatically reduce their radius by engagement with the top of the stack to release sheets from their respective sheet transporting slots. The finger units may be radially outwardly spring loaded to provide the transporting and inverting position for the sheets at a substantially greater radius than the reduced radius thereof at the stacking registration position.

[0009] Preferably, the finger units are independently pivotally mounted to the disk units.

[0010] Moreover, the finger units automatically adjust their radius to release sheets from their respective sheet transporting slots less than 3mm from the top of the stack at the stacking registration position.

[0011] The system further includes a vertically movable sheet hold-down bail system automatically actuated in coordination with the release of sheets from the sheet transporting slots at the stacking registration position to engage the sheets closely adjacent to the top of the stack.

[0012] The system of the present invention can prevent inadvertent stacked sheet skewing or damage, or damage to the fingers, due to variations in the stack height in the output area, i.e., a stack height which might otherwise be too high relative to the radius of the rotating disk unit. The fingers can automatically retract in their outer radius so as not to exceed the stack height as the fingers are rotated past the stack.

[0013] An additional advantage is provided by the allowable increase in the initial sheet transporting radius by outward movement of the fingers during that portion of their rotation, which can be greater than the radius at the sheet release area, so as to provide with such larger radius a better control over the inversion path for large flimsy sheets, thereby helping to push the trailing ends of such sheets further out over the stack as they are being inverted to reduce the tendency for premature sheet buckling or collapse and mis-stacking.

[0014] The system has synergistic cooperative advantages when combined with a bail or normal force stacking assistance system. By automatically releasing the incoming sheet very closely to the top of the stack, e.g., less than approximately 3mm above the stack, irrespective of stack height variations, in coordination with engagement of the sheet by an active bail system, sheet deformation from the bail engagement of the sheet between or outside of the fingers can be greatly reduced. By the bail or bails pressing down on each sheet as that sheet is being released only after that sheet is already almost resting on top of the stack, the bail cannot undesirably buckle the sheet to a large extent, even with bails laterally offset from the fingers carrying the sheets. In contrast to prior systems, the bails do not engage the incoming sheet while that sheet is still "airborne" or "floating" relatively unconstrained and liable to undesired misregistration movement until a substantial air cushion under that sheet is overcome and the sheet is finally brought down into contact with the preceding sheet on top of the stack. Of course, releasing the sheet without a bail engagement in that "airborne" or "floating" situation is even more likely to result in misregistration or mis-stacking, and both situations can be avoided here.

[0015] Variations in stack height of 6mm or greater can be automatically accommodated by the present invention without requiring a corresponding increase in the incoming next sheet release point or drop distance above the stack. This allows much less critical stack height control, feedback, and stacking tray elevator movement for the stack level repositioning. Also, there is improved accommodation for sheet edge curl in the stack affecting or causing uneven stack height. Furthermore, positive stack settling assistance by the disk fingers themselves can be provided (in addition to, or as an alternative to, the use of bails) to apply a normal force to the top of the stack during registration and stacking of the incoming next sheet.

[0016] Thus, by greatly reducing the normal release point of the sheet above the stack, the time for the bail to press the sheet down with sufficient normal force for non-slip engagement is also reduced. Also reduced are chances for bouncing of the bail relative to the sheet before the bail grips the sheet with sufficient vertical normal force and friction to prevent lateral sheet movement. The effective bail normal force here is increased and/or the bail mass can be reduced to decrease bouncing.

[0017] It is noted that incoming sheets bouncing or rebounding away from the registration wall or fingers while floating can be partially compensated by sloping the output tray downward toward the registration position. However, that compensation is not active, only gravitationally passive, is less effective for larger sheets, highly variable due to sheet to sheet friction, and is not considered to occur rapidly enough for rapid, high rate, printing systems.

[0018] Improved gripping of the sheet within the slot defined by the disk finger is also provided to better hold the sheet within the outer diameter of the slot and to be nearer to the release end of the slot at its maximum radius. This improved retention of the sheet within the disk (as the sheet is inverted, before it is released) is, however, here fully compatible with both subsequent sheet release onto the stack and optional lateral tamping for side registration of the same sheet during that movement. An example of such lateral sheet tamping systems is described in US-A-5 409 201.

[0019] Changes in the nip force of the sheet entrance springs for the nip slot is avoided by attaching the finger spring to the finger itself rather than to the disk carrying the finger. Thus, the movement of the finger relative to the disk does not change the spring tension in the spring which retains the sheets nipped in the finger slots.

[0020] The movable sheet transporting finger is preferably held outwardly away from the disk by another, very limited force, spring, with sufficient spring force to hold the finger out into the sheet receiving position, even for heavy sheets entering the finger, yet providing only a very low or minimal contact force between the finger and the top of the stack in the release area even if the finger is being substantially pushed in to a substantially reduced radius, against that spring force, by contact between the end of the finger and a high or full stack in the stacking area.

[0021] The system of the present invention is also fully compatible or incorporatable with on-line or subsequent stapling or other finishing of sets of sheets stacked for compiling with the above and other advantages. For example, the variable position stapling and registration system described in US-A-5 642 876 or set finishers described in other patents described above, such as US-

A-5 409 201, etc.

[0022] For a better understanding of the present invention, reference will now be made, by way of example only, to the accompanying drawings in which:-

Fig. 1 illustrates one embodiment of a disk unit in accordance with the present invention;
Fig. 2 illustrates another embodiment of a disk unit in accordance with the present invention;
Fig. 3 is a partially schematic, simplified side or end view of the embodiment of Fig. 2; and
Fig. 4 shows the embodiment of Fig. 2 in an output stacking and finishing module mounted to the output end of a printer.

[0023] In the following description, the term "sheet" refers to a usually flimsy physical sheet of paper, plastic, or other suitable physical substrate for images, whether precut sheet or initially web fed. A "copy sheet" may be abbreviated as a "copy", or called a "hard copy". A "job" is normally a set of related sheets, usually a collated copy set copied from a set of original document sheets or electronic document page images, from a particular user, or otherwise related.

[0024] Referring first to the Fig. 1, there is shown from the front (therefore from the side of the paper path or process direction) an output inverter-stacker system 10 comprising a plurality of disk units 12, of which the outboard one is visible in this view. A shaft 14 mounts and rotates these disk units 12 to invert and stack the sequential sheet output of a copier or printer for which the system 10 is an integral or modular output accessory. Here, each of the disk units 12 has two pivotal finger units 16a, 16b respectively independently oppositely mounted on each side of the disk unit 12. However, it is also possible to have a disk unit with only one such finger unit.

[0025] Each of the finger units 16a, 16b here defines sheet slots 18a, 18b into which the incoming sheets are fed by input roller nip 100 which may comprise part of the system 10 or which may be located in the output of an associated reproduction apparatus. The disk units 12 may be either stationary or moving when an incoming sheet is fed into the then uppermost sheet slot at that particular rotational position of the disk units 12. Here, that is the sheet slot 18a. As the sheets are fed into the sheet slots 18a or 18b, depending upon which finger unit 16a or 16b is uppermost at that point, the sheet is engaged by, and is fed past, a sheet entrance spring 19a or 19b. These springs 19a, 19b are mounted on the pivotal finger units 16a and 16b respectively, rather than on the disk units 12 themselves, so as to maintain a constant spring force engaging the entering sheet irrespective of the finger position. This spring 19a or 19b is preferably a highly elongated spring, cantilevered mounted at the end opposite from its sheet engagement position, and in position to guide the sheet to the outermost side of the sheet slot 18a or 18b. The sheet is not obstructed from entering the sheet slots 18a or 18b by the springs, and is preferably fed into the slot until the lead edge of the sheet engages the end of the slot, as described in the above-mentioned patents. The springs 19a or 19b, however, maintain a constant outward pressure against the sheet to hold the sheet outwardly as the disks rotate and also to provide a positive nip force engaging the sheet in the slots.

[0026] Each pivotal finger unit 16a and 16b is mounted at its downstream end by a pivotal mounting axis 20a or 20b to the disk unit 12 is accordance with the present invention. These finger units 16a and 16b, and thus their slots 18a or 18b, are normally held out to their maximum radius from the central shaft 14 by finger opening springs 22a and 22b, which are offset at one side of the finger unit so as not to interfere with sheet movement and are loaded between the finger unit 16a, 16b and the disk unit 12 to hold their respective finger unit 16a, 16b outwardly by only a light spring force, so that the finger unit 16a, 16b can be easily pivotally moved inwardly with low force toward the disk unit 12 to reduce the overall radius, as will be described below. The maximum outward or radial movement of the finger units 16a, 16b, and therefore the loading position of the sheet slots 18a, 18b, is controlled here by finger opening limiter slots 24a, 24b in which a finger opening limiter pin 26a, 26b on the disk unit 12 slides and serves as a stop.

[0027] As the disk unit 12 rotates, carrying and inverting the next sheet to be stacked on stack 44 in the output tray 42, the larger radius downstream end of the finger unit 16a or 16b, in which the outer end of the sheet slot 18a or 18b is located, may conventionally pass through a cutout or notch in the registration wall 40, which, as described in the prior art, causes the registration wall or fingers to engage the lead edge of that sheet and stop its forward movement, so that the continued rotation of the disk units 12 strips the sheet out of the slots 18a or 18b with the lead edge of the sheet held against the registration wall 40.

[0028] Referring to the lower or stripping area in Fig. 1, it may also be seen that the finger end outer surface 28b has a substantially larger radius than the upstream end of the fingers, especially in its spring 22b loaded outward position, and thus the slot 18b also tapers outwardly. Thus, as the sheet is stripped out of the slot 18b as shown here, the sheet is also being held downwardly by the spring 19b holding the sheet outwardly within the slot 18b, and providing beam strength in the arcuately deflected sheet, as long as the sheet is still partially held in finger unit 16b.

[0029] Somewhat prior to, and/or at the subsequent point in the rotation of disk unit 12 at which the lead edge area of the sheet is actually fully released out from the control of the sheet slot 18a or 18b, the outer end surface 28a or 28b of the sheet unloading finger is directly engaging the top of the stack 44. Thus, prior to and during sheet unloading or release, the sheet is effectively separated from the top of the stack by only the very thin

thickness of the outer wall of the finger outer end surface 28a, 28b. This finger tip can be as thin as 1 or 2mm.

[0030] This direct engagement of the finger tip outer end surface 28a or 28b with the top of the output stack 44 adjacent the registration wall 40 shortly before the end of sheet stripping from the finger slot 18a, 18b is enabled by the pivotal mounting of the finger units 16a, 16b. This allows each finger unit 16a, 16b to automatically adjust to the actual stack height during the stripping operation. It also allows the finger position to adjust to compensate for spacing differences between respective disk units 12, manufacturing tolerances, unevenness or movement errors in the stack elevator control of the output tray 42, and sheet curling, staples, or other unevenness in the sheet stack 44.

[0031] Thus, in accordance with the present invention, the sheet, before it is released, is positively brought down into very close spacing, and/or even partially in direct contact, with the top of the stack 44 of preceding sheets, rather than, as discussed above, released in mid-air above the stack, or accidentally striking the top of the stack with a rigid disk and skewing the stack or damaging the sheets.

[0032] As described in US-A-5 409 201, it is highly desirable to coordinate the release of the incoming sheet to be stacked with the lowering thereon of a bail such as 30, preferably with a high friction rubber or other bail tip 32 to engage with normal force and help hold the sheet in its proper registration position. In Fig. 1, the lifting of the bail 30 up out of the incoming sheet path and its subsequent release to drop onto that sheet at the appropriate time is controlled by a cam track 36a or 36b, which here is molded into the side of disk unit 12 in a position to engage and lift a bail pin 34 on the bail 30 which rides up on top of the respective cam track to the end thereof as the disk unit 12 rotates, whereupon the bail 30 is released to drop onto the sheet being stripped.

[0033] Turning now to the alternative embodiment of Figs. 2 and 3, an output inverter-stacker system 50 has disk units 52 mounted on a shaft 54, the disk units 52 having pivotal finger units 56a and 56b with integral sheet slots 58a and 58b, and the finger units 56a and 56b are pivotally mounted on axes 60a and 60b respectively. This is similar to the embodiment described in Fig. 1.

[0034] Finger opening springs 62a and 62b are leaf springs adjacent the axes 60a, 60b, but they provide the same function in outwardly urging the finger units 56a, 56b to pivot outwardly about the axes 60a, 60b to the maximum radial extension of their outer ends 68a, 68b allowed by the finger opening limits or stops provided by limiter slots 64a, 64b with limiter pins or fasteners 66a and 66b, snap fitted into the disk units 52.

[0035] Bails 70 in system 50 are similar to those shown and described in US-A-5 409 201. Bail 70 is lifted by a bail actuating lever 72 connecting thereto, which lever 72 is engaged by a bail cam actuator pin 69a or 69b on the disk unit 52 as the it rotates. As before, sheet entrance springs 59a, 59b are provided for maintaining a constant spring force on the entering sheet irrespective of finger position. The bail 70 and its bail tips 74 operate, however, in a similar manner to that described above. In this embodiment of Figs. 2 and 3, as in the Fig. 1 embodiment, the bail 70 cooperates with the pivotal finger units 56a, 56b to provide almost continuous control over the sheet with little or no "flotation" of the sheet, bounce back from registration wall 80, or other undesirable sheet handling, due to the release of the sheet by the disk slots 58a, 58b and engagement of the sheet by the bail tips 72 both occurring very closely above the top of stack 84 at all times, irrespective of the stack 84 height or underlying tray 82 position, due to the automatic compensation of the sheet release point by the pivotal movement of the finger unit 56a, 56b, allowed by its pivotal mounting and rotation about its axis 60a, 60b, and the low resistance flexing of the finger opening springs 62a, 62b. Since the bail 70 comes down on the incoming sheet after that sheet is partially and/or almost in contact with the top of the stack 84, the bail tip 74 cannot significantly buckle or corrugate the sheet and almost immediately provides positive engagement and hold down of the sheet.

[0036] In Fig. 4, the output inverter-stacker system 50 of Figs. 2 and 3 are shown in the output of a copier or printer. Sheets are fed from the copier or printer, in the direction of the arrow A, to input roller nip 100 and directed into slot 58a in finger unit 56a. The disk unit 52 rotates, in the direction of arrow B, to invert and release the sheet onto the top of stack 84 in tray 82. As slot 58a is the stacking registration position and is releasing a sheet, slot 58b is in a position to receive a further sheet from the roller nip 100.

[0037] As noted above, the pivotal finger units disclosed herein can greatly reduce their radius by their pivotal movement to accommodate substantial variations in the difference in radius between the central mounting shaft of the disk unit and the top of the stack. Yet, these same finger units can substantially pivot outwardly during the inversion movement of the sheet prior to the release area so as to provide better control over the sheet as it is being inverted, thereby pushing out the trailing areas of the sheet further out over the stack, and thus reducing the chances of the sheet trail area folding or buckling and mis-stacking. The sheet slot entrance level or position can desirably be at a constant fixed height position, defined by the above-described finger opening limiter slots and pins. Since there are two finger units per disk unit here, one sheet can be loaded into one finger and transported by its initially large radius position sheet slot while another sheet is being registered and stacked with its finger moved in to a much smaller radius position, varied automatically to compensate for the stacking position.

[0038] The finger units are described above as pivotally mounted, and that is presently preferred. However, it may be possible that with appropriate suitable plastic

materials and moldings to provide sufficiently flexible finger cantilever mountings to the disk units so that they may be sufficiently radially movable inwardly from their outer ends with low force by contact with the top of the stack to provide the above - described features, are inherently lightly spring loaded outwardly, yet have sufficient stiffness internally to provide suitable sheet carrying slots.

[0039] The disclosed system may be operated and controlled by appropriate operation of conventional control systems. It is well known and preferable to program and execute imaging, printing, paper handling, and other control functions and logic with software instructions for conventional or general purpose microprocessors, as taught by numerous prior patents and commercial products. Such programming or software may of course vary depending on the particular functions, software type, and microprocessor or other computer system utilized, but will be available to, or readily programmable without undue experimentation from, functional descriptions, such as those provided herein, and/or prior knowledge of functions which are conventional, together with general knowledge in the software and computer arts. Alternatively, the disclosed control system or method may be implemented partially or fully in hardware, using standard logic circuits or single chip VLSI designs.

[0040] It is well known that the control of sheet handling systems may be accomplished by conventionally actuating them with signals from a microprocessor controller directly or indirectly in response to simple programmed commands, and/or from selected actuation or non-actuation of conventional switch inputs such as switches selecting the number of copies to be made in that job or run, selecting simplex or duplex copying, selecting a copy sheet supply tray, etc. The resultant controller signals may conventionally actuate various conventional electrical solenoid or cam-controlled sheet deflector fingers, motors or clutches, or other components, in programmed steps or sequences. Conventional sheet path sensors or switches connected to the controller may be utilized for sensing, counting, and timing the positions of sheets in the sheet paths of the reproduction apparatus, and thereby also controlling the operation of sheet feeders and inverters, etc., as is well known in the art.

Claims

1. A disk type sheet inverting and stacking system (10; 50) having a stacking registration position, the system (10; 50) comprising rotatable disk units (12; 52) with sheet transporting slots (18a, 18b; 58a, 58b) for transporting printed sheets output by a reproduction system, the sheets being inverted by rotation of the disk units (12; 52) and then released from the sheet transport slots (18a, 18b; 58a, 58b) thereof to be stacked on top of a stack (44; 84) located at the stacking registration position;

   characterised in that each rotatable disk unit (12; 52) comprises finger units (16a, 16b; 56a, 56b) mounted thereon for radial movement relative thereto, the radially movable finger units (16a, 16b; 56a, 56b) forming the sheet transporting slots (18a, 18b; 58a, 58b) thereon so that the finger units (16a, 16b; 56a, 56b) provide variable radius and variable position for the sheet transporting slots (18a, 18b; 58a, 58b) with radial movement of the pivotal finger units (16a, 16b; 56a, 56b);

   and in that the finger units (16a, 16b; 56a, 56b) automatically adjust their radius to release sheets from their respective sheet transporting slots (18a, 18b; 58a, 58b) closely adjacent to the top of the stack (44; 84) of sheets at the stacking registration position thereby automatically compensating for variations in the height of the stack (44; 84) at the stacking registration position.

2. A system according to claim 1, wherein the finger units (16a, 16b; 56a, 56b) automatically reduce their radius by engagement with the top of the stack (44; 84) to release sheets from their respective sheet transporting slots (18a, 18b; 58a, 58b).

3. A system according to claim 2, wherein the finger units (16a, 16b; 56a, 56b) are radially outwardly spring loaded to provide the transporting and inverting position for the sheets at a substantially greater radius than the reduced radius thereof at the stacking registration position.

4. A system according to any one of claims 1 to 3, wherein the finger units (16a, 16b; 56a, 56b) are independently pivotally mounted to the disk units (12; 52).

5. A system according to any one of the preceding claims, wherein the finger units (16a, 16b; 56a, 56b) automatically adjust their radius to release sheets from their respective sheet transporting slots (18a, 18b; 58a, 58b) less than 3mm from the top of the stack (44; 84) at the stacking registration position.

6. A system according to any one of the preceding claims, further including a vertically movable sheet hold-down bail system (30, 32, 34, 36a, 36b; 70, 72, 74) automatically actuated in coordination with the release of sheets from the sheet transporting slots (18a, 18b; 58a, 58b) at the stacking registration position to engage the sheets closely adjacent to the top of the stack (44; 84).

Patentansprüche

1. Schaufelrad-Blattwendestapelsystem (10; 50) mit

einer Stapeljustierposition, wobei das System (10; 50) drehbare Schaufelradeinheiten (12; 52) mit Blatttransportschlitzen (18a, 18b; 58a, 58b) zum Transport bedruckter Blätter, die von einem Reproduktionssystem ausgegeben werden, umfasst, wobei die Blätter durch Rotation der Schaufelradeinheiten (12; 52) gewendet und anschließend von den Blatttransportschlitzen (18a, 18b; 58a, 58b) ausgegeben werden, um auf einem an der Stapeljustierposition befindlichen Stapel (44; 84) gestapelt zu werden;
dadurch gekennzeichnet, daß jede drehbare Schaufelradeinheit (12; 52) Greifelemente (16a, 16b; 56a, 56b) umfaßt, die an diesen und radial relativ zu diesen bewegbar befestigt sind, wobei die radial bewegbaren Greifelemente (16a, 16b; 56a, 56b) die Blatttransportschlitze (18a, 18b; 58a, 58b) derart bilden, dass die Greifelemente (16a, 16b; 56a, 56b) einen veränderlichen Radius und eine veränderliche Position für die Blatttransportschlitze (18a, 18b; 58a, 58b) bei radialer Bewegung der drehbaren Greifelemente (16a, 16b; 56a, 56b) bereitstellen;
und dass die Greifelemente (16a, 16b; 56a, 56b) automatisch ihren Radius einstellen, um Blätter aus ihren jeweiligen Blatttransportschlitzen (18a, 18b; 58a, 58b) in geringem Abstand zum Gipfel des Stapels (44; 84) der Blätter an der Stapeljustierposition freizugeben, um damit automatisch Änderungen in der Höhe des Stapels (44; 84) an der Stapeljustierposition auszugleichen.

2. Das System nach Anspruch 1, wobei die Greifelemente (16a, 16b; 56a, 56b) durch Kontakt mit der Oberseite des Stapels (44; 84) automatisch ihren Radius verringern, um Blätter von ihren jeweiligen Blatttransportschlitzen (18a, 18b; 58a, 58b) freizugeben.

3. Das System nach Anspruch 2, wobei die Greifelemente (16a, 16b; 56a, 56b) radial nach außen vorgespannt sind, um die Transport- und Blattwendeposition für die Blätter mit einem wesentlich größeren Radius als deren verringerten Radius an der Stapeljustierposition bereitzustellen.

4. Das System nach einem der Ansprüche 1 bis 3, wobei die Greifelemente (16a, 16b; 56a, 56b) unabhängig drehbar an den Schaufelradeinheiten (12; 52) montiert sind.

5. Das System gemäß einem der vorhergehenden Ansprüche, wobei die Greifelemente (16a, 16b; 56a, 56b) automatisch ihren Radius einstellen, um Blätter von ihren jeweiligen Blatttransportschlitzen (18a, 8b; 58a, 58b) mit weniger als 3 mm von der Oberseite des Stapels (44; 84) an der Stapeljustierposition freizugeben.

6. Das System gemäß einem der vorhergehenden Ansprüche, das weiterhin ein vertikal bewegbares Sicherungssystem zum Niederdrücken der Blätter (30, 32, 34, 36a, 36b; 70, 72, 74) umfaßt, das automatisch und koordiniert mit dem Freigeben der Blätter aus den Blatttransportschlitzen (18a, 18b; 58a, 58b) an der Stapeljustierposition betätigt wird, um die mit geringen Abstand an der Oberseite des Stapels (44; 84) freigegebenen Blätter zu erfassen.

Revendications

1. Dispositif d'inversion et d'empilage de feuilles du type disque (10 ; 50) ayant une position de repérage d'empilage, le dispositif (10 ; 50) comprenant des unités rotatives à disque (12 ; 52) pourvues de fentes de transport de feuilles (18a, 18b ; 58a, 58b) destinées à transporter les feuilles imprimées sorties d'un dispositif de reproduction, les feuilles étant inversées par la rotation des unités à disque (12 ; 52) et dégagées ensuite des fentes de transport de feuilles (18a, 18b ; 58a, 58b) de celui-ci pour être empilées au sommet d'une pile (44 ; 84) située à la position de repérage d'empilage ;
caractérisé en ce que chaque unité rotative à disque (12 ; 52) comprend des unités formant doigts (16a, 16b ; 56a, 56b) qui y sont montées pour se déplacer dans la direction radiale par rapport à celle-ci, les unités de doigts pouvant se déplacer dans la direction radiale (16a, 16b ; 56a, 56b) formant les fentes de transport de feuilles (18a, 18b ; 58a, 58b) sur celle-ci de sorte que les unités formant doigts (16a, 16b ; 56a, 56b) créent un rayon variable et une position variable pour les fentes de transport de feuilles (18a, 18b ; 58a, 58b) grâce au déplacement radial des unités pivotantes formant doigts (16a, 16b ; 56à, 56b) ;
et en ce que les unités formant doigts (16a, 16b ; 56a, 56b) ajustent automatiquement leur rayon pour dégager les feuilles de leur fente de transport de feuilles respectives (18a, 18b ; 58a, 58b) très voisines du sommet de la pile (44 ; 84) de feuilles au niveau de la position de repérage d'empilage, compensant automatiquement par ce moyen les variations de hauteur de la pile (44 ; 84) au niveau de la position de repérage d'empilage.

2. Dispositif selon la revendication 1, dans lequel les unités formant doigts (16a, 16b ; 56a, 56b) réduisent automatiquement leur rayon en venant en prise avec le sommet de la pile (44 ; 84) pour dégager les feuilles de leur fente de transport de feuille respective (18a, 18b ; 58a, 58b).

3. Dispositif selon la revendication 2, dans lequel les unités formant doigts (16a, 16b ; 56a, 56b) sont sous l'action d'un ressort vers l'extérieur dans la di-

rection radiale pour créer la position de transport et d'inversion des feuilles avec un rayon sensiblement plus grand que le rayon réduit de celles-ci au niveau de la position de repérage d'empilage.

4. Dispositif selon l'une quelconque des revendications 1 à 3, dans lequel les unités formant doigts (16a, 16b ; 56a, 56b) sont montées indépendamment sur les unités à disque (12 ; 52)de façon à pouvoir pivoter.

5. Dispositif selon l'une quelconque des revendications précédentes, dans lequel les unités formant doigts (16a, 16b ; 56a, 56b) ajustent automatiquement leur rayon pour dégager les feuilles de leur fente de transport de feuille respective (18a, 18b ; 58a, 58b) à moins de 3 mm du sommet de la pile (12 ; 52) au niveau de la position de repérage d'empilage.

6. Dispositif selon l'une quelconque des revendications précédentes, comprenant en outre un dispositif à balancier de maintien en bas des feuilles mobiles dans la direction verticale (30, 32, 34, 36a, 36b ; 70, 72, 74) actionné automatiquement en coordination avec le dégagement des feuilles des fentes de transport de feuille (18a, 18b ; 58a, 58b) au niveau de la position de repérage d'empilage pour engager les feuilles très voisines au sommet de la pile (44 ; 84).

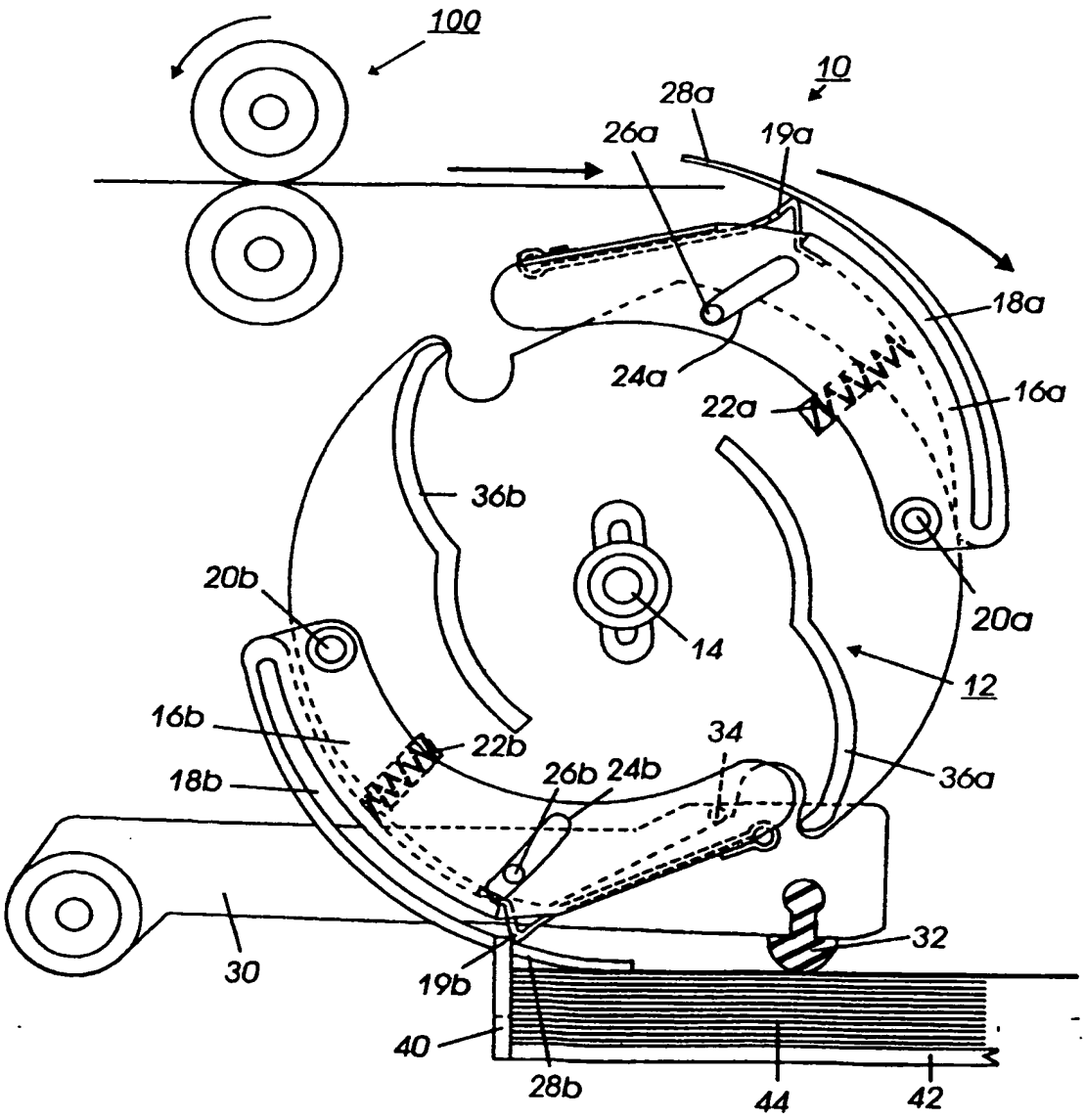
100
10
28a
26a
19a
18a
24a
22a
16a
36b
20b
20a
14
12
16b
22b
34
18b
26b
24b
36a
32
30
19b
40
28b
44
42

FIG. 1

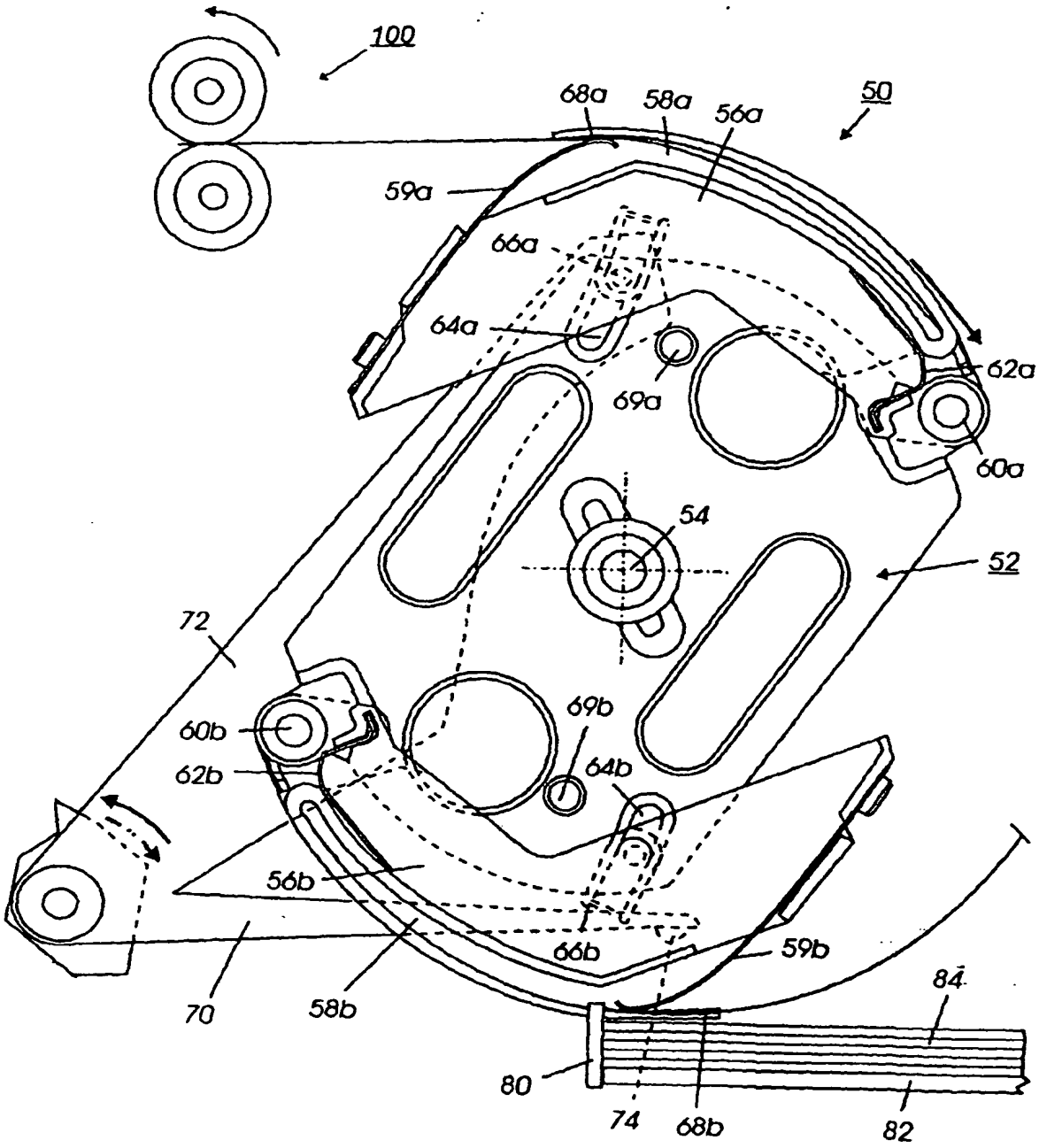
100
50
68a
58a
56a
59a
66a
64a
69a
62a
60a
54
52
72
60b
62b
69b
64b
56b
66b
59b
70
58b
84
80
74
68b
82

FIG.2

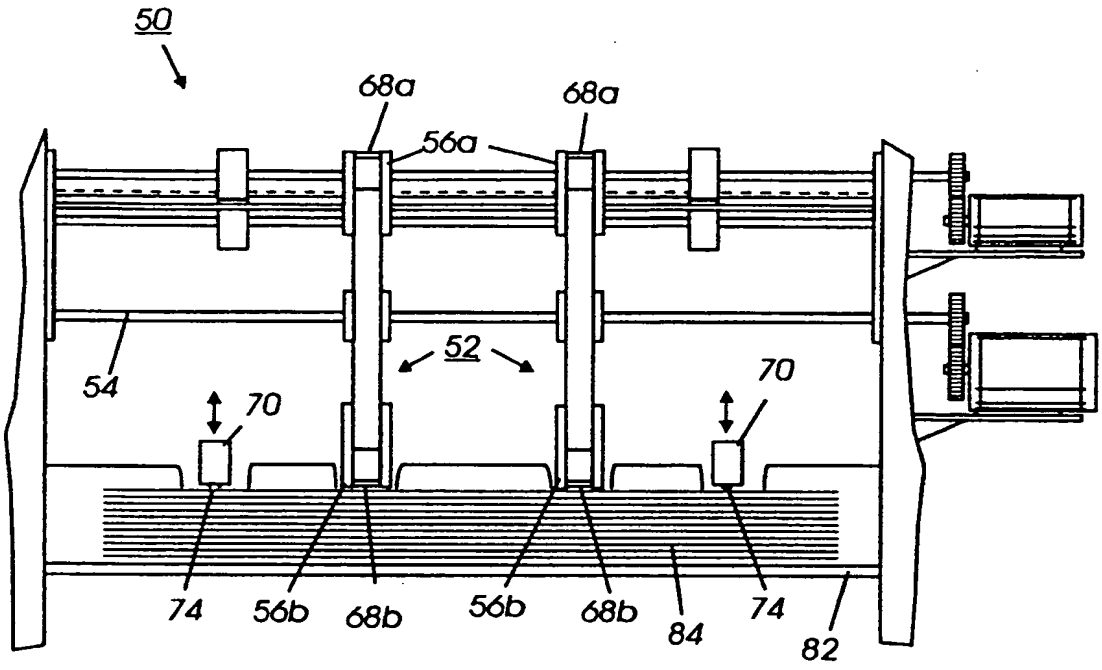

FIG.3

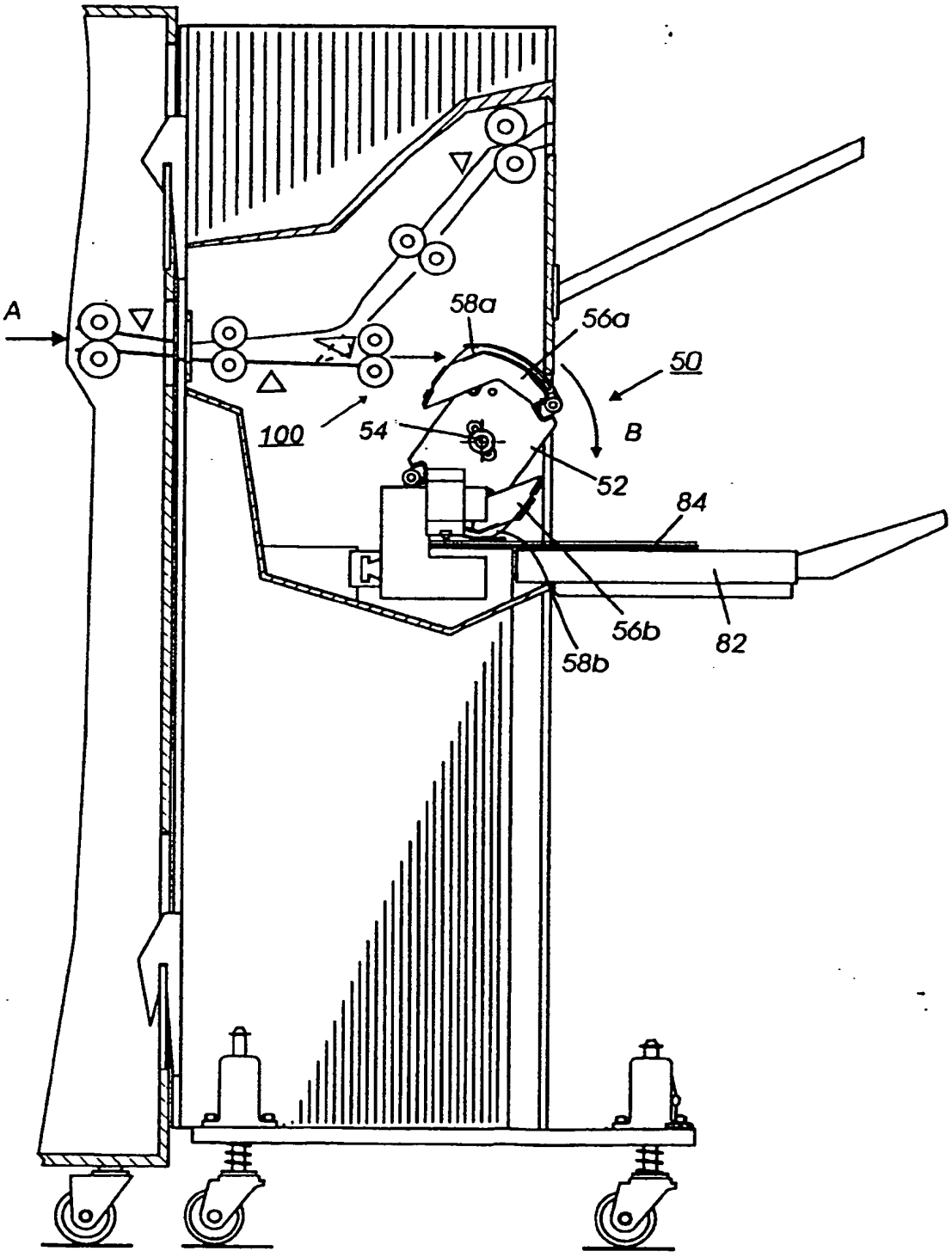

FIG.4